too, upon the proper spacing of the letters in the lines, as well as of the lines themselves, for the same astigmatic eye may, with different degrees of accommodative action, be troubled either by an apparent running together of the letters, or by confusion of the lines.

Test-letters for determining the acuteness of vision should be constructed, therefore, not only of sizes proportionate to the distances at which they are designed to be used, but also in such a manner as neither to exaggerate nor conceal the visual defects due to astigmatism. To this end they should be made up, so far as may be, in about equal proportions of vertical and horizontal lines of uniform thickness. Each letter, too, should be, as nearly as is consistent with good proportion, of equal height and width, and the spaces, both between the letters and the lines, should be proportionate to the size of the letters. These conditions were first realized by Snellen, in his "Letterproeven," or "Test-types," published in Utrecht in 1862, and now almost universally adopted as the standard of visual comparison. It is possible, however, that the very simple "Gothic" form of letter **TH** may be preferable to the somewhat more complex "Antique" letter **TH** adopted by Snellen; the experiment has been partially tried in a recent work by Dr. Williams, of Boston (*Recent Advances in Ophthalmic Science*, Boston, 1866).

ST. LOUIS, October, 1866.

ART. VI.—*New Method of Employing Heat as a Resuscitating Agent.*

By JOSEPH G. RICHARDSON, M. D., Union Springs, Cayuga County, New York.

IN the number of this journal for January, 1866, on p. 225, appeared the abstract of a paper by Dr. B. W. Richardson, of London, detailing the commencement of an investigation into the means for rekindling the vital spark when almost extinct, which gave promise of very important results, had not the experimenter's attention been diverted to the opposite desideratum of accomplishing a temporary local death; which he did by the application of ether spray, an invention that has been received, and justly, with so much eclat by the profession both of Europe and of our own Western Hemisphere.

The following case occurred to me shortly after reading the above mentioned digest of Dr. Richardson's paper, and it was during the long hours of anxious night-watching over its subject, the uncertain pulsations of whose feeble heart I was so earnestly striving to invigorate, that those experiments led me to the practice which proved so successful in renewing its frail life, and which I propose briefly to narrate, hoping that it may assist some brother practitioner under circumstances of similar urgency:—

On the 17th of February, 1866, I was called to attend Mrs. J. McC., a healthy woman of robust constitution, whom I had delivered some two years before of a still-born infant after a very protracted and exhausting labour, the consequence of a marked narrowing of the pelvis at its inferior strait. Finding that parturition was again rapidly approaching, and that the pains were active and frequent, I immediately examined per vaginam and discovered a breech presentation, which, coupled with the probability of another tedious labour, even under the most favourable circumstances, rendered the prognosis as regarded the child's life a very serious one. After the anticipated delay, delivery was accomplished about half past one o'clock on the morning of the 18th; but the infant, when born, was completely relaxed, and made no effort to respire, although a feeble pulsation was perceptible at the præcordia. The usual treatment of the hot bath, cold affusion, &c. &c., being employed without effect, I resorted to artificial respiration, and after a few repetitions of the mouth to mouth process of insufflating the lungs, finding that the heart seemed to beat with a little more force, I was encouraged to continue the treatment. Half an hour elapsed, however, without any further sign of life, and I was about to abandon the case as hopeless, when the child gave a single gasp which was succeeded by others at intervals of nearly a minute; still continuing artificial respiration, I now sought to reinforce it by bathing the chest with whiskey, moistening the lips and tongue with a mixture of spirits of ammonia, applying mustard to the feet and epigastrium, and friction to the extremities; but although by these means voluntary inspiration was obtained at decreasing intervals, until, at the end of two hours, phrenic contraction occurred about every twenty seconds, yet I had the disappointment of finding that whenever artificial expansion of the lung was intermitted, as, through fatigue, I was several times compelled to allow it to be, the intervals between the voluntary efforts became greater and the cardiac pulsations grew more feeble. Seeing, therefore, that the treatment hitherto had in reality accomplished only a temporary and evanescent resuscitation of the powers of life, and spurred on by the obvious necessity of some more potent means, I mentally reviewed the record I had so lately read of Dr. Richardson's remarkable success in restoring the heart's motion by injecting hot blood into the coronary arteries, and after many fruitless efforts to invent a feasible plan for applying that process in the case before me, hit upon the simple expedient of heating the blood in the veins themselves, and then assisting by external pressure to force it back to the heart; with the expectation that with the partial absence of that usual refrigerating agency, inspired air, it would pass over the short pulmonic circuit and be distributed to the cardiac structure without any material diminution of temperature. To carry out this idea I directed a hot fire to be kindled up in the large cooking stove, and having made a bed of old flannels on its ample hearth, I laid the corpse-like body upon it, and with the assistance of some attendants heated the child's legs and arms alternately only a little short of the blistering point, and then by firm centripetal friction drove the hot blood along its desired course. The effect of this treatment was almost miraculous; the heart's pulsation, which, in spite of three hours' labour with artificial respiration and its adjuncts, had continued feeble and uncertain, grew rapidly full and energetic; the respiration, which had commenced again to prolong its intervals, changed its gasping character, became continuous, and although groaning, otherwise almost normal; and to crown all, the limbs, which had heretofore dangled relaxed from the apparently lifeless trunk, soon exhibited signs of vitality, which, beginning first, after some ten minutes roasting, with a slight tremulous movement of the extensors of the right leg, gradually traversed the entire muscular system until the whole tiny frame shook like an aspen leaf, quivering, one might almost think, with too rude a blast of the breath of life. I remained with the infant for an hour or so longer and experienced the intense satisfaction of observing a continued, though tardy improvement, the skin gradually losing its blue colour and assuming the pink tint of a healthy new-born babe's. Being then compelled to visit some patients at a distance of several miles, I reluctantly left it in charge of the attendant, with the strictest injunctions against attempting to give even the smallest particle of food or drink, fearing, as I did, that the muscular movements were not yet sufficiently established to enable it to swallow. On returning about two o'clock in the afternoon, I can hardly describe my vexation at finding that some ignorant and officious old woman of the neighbourhood had insisted on feeding it with some molasses and water, and that, to the consternation of the mother and nurse, it had, after a few ineffectual struggles, expired in the effort at deglutition.

The arduous duties of a country practice have debarred me from any extended investigations in this matter, but the following experiments performed on the 29th of August, 1866, tend to prove the correctness of my supposition that the circulating fluid could be so far heated through the walls of the bloodvessels as to be rendered active in re-establishing the cardiac movements.

The subject in this case was a young chicken that had been accidentally drowned; carefully opening the thorax in such a way as to avoid any large arteries or veins, I found the heart still beating at 7.55 A. M., twenty minutes after the last gasp, which occurred directly on removal from the water; in ten minutes more it ceased to pulsate naturally, although answering readily to external irritation with the point of a knife, and like the pendulum of a clock almost run down, it would vibrate more and more slowly for some minutes. At 9 A. M., one hour and twenty minutes after respiration ceased, the heart, remaining in situ, was exposed to the heat of a stove under circumstances as far as possible precisely resembling those to which the infant above mentioned was subjected; after submitting it to this heat for one minute, the cardiac movements which a short time before, even under the stimulus of puncture, had been weak and uncertain, recommenced strongly and regularly at the rate of about fifty beats per minute; when the body of the fowl, however, was removed from the fire these contractions gradually diminished until they ceased to be voluntary, and even irritation was feebly responded to. At 9.50 A. M., two hours and a quarter having elapsed after death, the heart was slightly moistened with warm water and again heated as before; without any other agency the auricles and upper portions of the ventricles, which had become relaxed and shrunken, voluntarily contracted and resumed their normal rhythmic movements, though at the rate of only eighteen pulsations per minute, and this continued for some little time after removal from the source of heat. Lastly, that no doubt might remain as regarded the revivifying power of fire (in this subject at least), I waited another twenty minutes until the cardiac pulsations had again become silent, and then found them to be restored (though at the slower but still regular rate of one in five seconds), by a further application of the life-renewing heat.

Dr. Sansom, in his recent work on the *Action and Administration of Chloroform*, details, in his chapter on Resuscitation, from apparent death by that agent, two experiments of his own which have some bearing upon this subject. In the first—

> "The movements of the exposed heart of a kitten were arrested by chloroform vapour, then a jet of steam was directed upon the organ; the effect was instantly to restore rhythmical contraction. (2.) A rabbit was chloroformed until apparent death took place. After a few inflations of the lungs the chest was opened and the heart found beating rhythmically. Warm air of a temperature of 98 Fahr. was blown into the lungs by means of a pair of bellows, an elastic catheter being introduced into the mouth. The heart's pulsations were certainly increased in force and rhythm (?) a contraction of the ventricles taking place just after each inflation."

Thus it will be seen that the result of Dr. Sansom's first experiment accords precisely, so far as it goes, with that furnished by my own, and as regards his second, may not the current of warm air injected into lungs have produced its beneficial effects by imparting caloric to the blood while contained in the vascular network of the pulmonary vesicles, from whence it would be driven in a few seconds into the coronary arteries and then exert its stimulating power upon the cardiac structure? Were it not for the danger of causing pneumonia, heating the blood thus through the lungs would be a great improvement on the plan above described, but while blistering, or even burning the skin upon portions of the extremities, would prove but a minor evil in comparison with the individual's death, production of such acute *pulmonary* inflammation must imperil the very life we seek to save.

I may further mention, as, in its small way, an analogue to the primary fact upon which Dr. Jenner based his immortal discovery, that a few weeks after attending the infant as above narrated, I was called to see a little son of one of the largest sheep-breeders in this section, and, during my visit, observing a huge basket in the corner of the dining-room, from which issued an almost continuous bleating, was naturally led to inquire about the lambs. I learned that those which seemed feeble were brought into the house, dried, warmed, and fed with whiskey sling, by which means most of them were restored, but I noticed that while a number struggled in a purposeless way around the basket one lay with its eyes closed and to all appearance dying; of this the owner remarked: "That fellow is pretty near gone; nothing but roasting will save him." In some surprise at the coincidence, I inquired whether that was of much service. "Oh, yes," replied Mr. C. "When everything else fails I put them close before the stove and give them a good roasting; *that often brings them to life again;*" adding, afterwards, "It's astonishing what an amount of heat they will bear, and do them good too." Thus forcibly illustrating by his experience the truth so often noted, that our boasted science, while it teaches us to work intelligently and with a skilful adaptation of varying means to diverse ends, is yet on many occasions a tardy guide in comparison with popular observation.

If, as an English writer has remarked, the spirit of the Royal Humane Society's directions for resuscitation can be summed up in the one word *Warmth*, this proposition may be expressed as simply to advance another step, having the monosyllable *Heat* for its exponent; and I hope that some of the many readers of this journal who have more abundant opportunities for such experiments, will investigate and report the practical value contained in the suggestion of artificially heating the blood (not warming it merely, as has been heretofore advised) within the limbs of persons apparently dead, and then propelling it as rapidly as possible towards the heart, the pulsations of which are probably, in some instances at least, so weak and infrequent as to escape observation for minutes before they finally cease. The method seems to promise somewhat not only in the cases of still-born infants, but also in those of patients asphyxiated by drowning, hanging, or the inhalation of noxious gases, especially the vapour of chloroform, and it possesses the great advantage that its essentials are almost always readily accessible.

ART. VII.—*The Permanganate of Potash in the Treatment of Carbuncle.* By THAD. L. LEAVITT, M. D., of Germantown, Pa.

THE beneficial effects accruing from the local use of the permanganate of potash in the treatment of sloughing ulcers, phlegmonous erysipelas, and hospital gangrene, having been most thoroughly tested and proved during the last year of the war, in army hospital life, it occurred to me that its peculiar remedial qualities would alike prove successful in that most painful and distressing lesion, carbuncle, originating as it also does, from a depressed vitality, and a morbific condition of the blood. The most satisfactory and encouraging results have been obtained in the only cases in which I have had an opportunity to employ it.

Mrs. R——, æt. about 60 years, was visited, during the absence from town of her family physician, and found suffering terribly from a carbuncle located upon the left shoulder-blade, just above the spine of the scapula, and occupying the supra-spinous fossa. Loss of sleep, constant pain, and a naturally nervous temperament combined, induced a mental disturbance almost amounting to delirium. The tumour was in its sixth day, with all the general accompaniments, of the size of a hen's egg, tumid, tense and shining. A free crucial incision had been made two days before, but with no relief; dense areolar tissue, puffy granulations, and sanious oozings crowded the track of the knife, with no appearance of separation or healthy action. The pulse was quick and compressible, 110 beats in the minute;